Claims:

1.   A mass analyzer for analyzing ions, having an ion transmission device comprising;

    (a)   a set of elongated rods, having a first end and a second end, said set of elongated rods positioned along an axis, defining an inscribed circle between the rods, said inscribed circle having a radius r_o, wherein the radius at the first end and at the second end is different,

    (b)   means for applying a RF voltage to said elongated rods,

2.   A mass analyzer in claim 1, wherein the set of elongated rods comprises at least one pair of opposite rods.

3.   A mass analyzer in claim 1, wherein the set of elongated rods have a quadrupole configuration.

4.   A mass analyzer in claim 2 or 3, wherein at least one rod includes an opening through which ions are ejected.

5.   A mass analyzer in claim 4, wherein the opening is a slot.

6.   A mass analyzer in claim 5, further comprising, for each rod including said slot, an array detector positioned to detect the intensity and position of the ions which exit through said opening.

7.   A mass analyzer in claim 2, further comprising means for applying a DC offset voltage applied to said rods.

8.   A mass analyzer in claim 6 or 7, further comprising means for applying a supplementary AC voltage across one of the pairs of rods.

9.   A mass analyzer in claim 8, further comprising two array detectors, each positioned approximately behind one of the elongated rods to which the supplementary AC voltage is applied.

11. A mass spectrometer system having more than one mass analyzer, comprising a mass analyzer according to claim 1.

12. A mass analyzer in claim 11 having a means for storing ions for pulse injection into said mass analyzer.

13. A mass analyzer in claim 11 having a means for collision induced dissociation for injecting fragmented ions into said mass analyzer.

14. A mass analyzer in claim 11 having a means for ion mobility separation for injecting ions into said mass analyzer.

15. A method mass analyzing ions, said method comprising:

a. providing a set of elongated rods, having a first end and a second end, and located round an axis defining an inscribed circle between the rods with a radius r_0, and varying the radius r_0 along the length of the set of elongated rods;

b. admitting ions into said first end of said rod set,

c. transmitting ions through the set of elongated rods, whereby at least some of said ions become unstable at a location along the set of elongated rods dependent on the mass to charge ratio thereof;

d. permitting the unstable ions to be ejected substantially orthogonal to the axis;

e. detecting the ejected unstable ions after the ejected unstable ions exit the set of elongated rods.

16. A method according to claim 15 wherein, in step (b), ions are admitted from a collision cell.

19.   A method as claimed in claim 15, including in step (b), admitting ions into the set of elongate rods with desired characteristics of position, direction and velocity, relative to the axis, to promote detection of ions of interest.